What is claimed is:

1. A filter assembly, comprising:

an enclosure having at least one cavity;

at least one wall of the enclosure comprised of a circuit board;

a trace formed on the circuit board; and

at least one circuit element, coupled to the trace.

2. The filter assembly of claim 1, wherein the circuit board further comprises a ground plane on a surface of the circuit board that forms a portion of the inner surface of the enclosure.

3. The filter assembly of claim 1, wherein the circuit board further comprises multiple circuit trace layers.

4. The filter assembly of claim 1, wherein the at least one circuit element further comprises a low pass filter.

5. The filter assembly of claim 4, wherein the low pass filter further comprises one of a circuit trace filter element and a mechanical structure filter element.

6. The filter assembly of claim 1, wherein the at least one circuit element further comprises an amplifier.

7. The filter assembly of claim 6, wherein the amplifier is one of a low noise amplifier and a power amplifier.

8. The filter assembly of claim 1, wherein the filter assembly further comprises:

an input connector attached to the enclosure and coupled to the at least one cavity; and

an output connector attached to the enclosure and coupled to the at least one cavity.

9. The filter assembly of claim 1, wherein the filter assembly further comprises:

an input connector attached to the circuit board and coupled to the at least one cavity; and

an output connector attached to the circuit board and coupled to the at least one cavity.

10. The filter assembly of claim 6, wherein the filter assembly further comprises:

an input connector attached to the circuit board and coupled to the at least one cavity;

an output connector attached to the circuit board coupled to an output of the amplifier; and

an output coupling pad mounted in the at least one cavity and coupled to an input of the amplifier.

11. The filter assembly of claim 6, wherein the filter assembly further comprises:

an input connector attached to the circuit board and coupled to an input of the amplifier;

an input coupling pad mounted in the at least one cavity and coupled to an output of the amplifier; and

an output connector attached to the circuit board coupled to the at least one cavity.

12. The filter assembly of claim 1, wherein the filter assembly further comprises:

a first and a second low noise amplifier;

an input connector attached to the circuit board and coupled to an input of the first low noise amplifier;

an input coupling pad mounted in the at least one cavity and coupled to an output of the first low noise amplifier;

an output coupling pad mounted in the at least one cavity and coupled to an input of the second low noise amplifier; and

an output connector attached to the circuit board coupled to an output of the second low noise amplifier.

13. The filter assembly of claim 1, wherein the filter assembly further comprises:

a first filter stage and a second filter stage formed in the enclosure, wherein the first and second filter stage each have at least one cavity;

an input connector attached to the circuit board and coupled to the first filter stage;

an output coupling structure mounted in the at least one cavity of the first filter stage and coupled to an input of a low noise amplifier;

an input coupling structure mounted in the at least one cavity of the second filter stage and coupled to an output of the low noise amplifier; and

an output connector attached to the circuit board coupled to the at least one cavity of the second filter stage.

14. The filter assembly of claim 1, wherein the at least one circuit formed in the circuit board comprises an inter-stage coupling circuit, the inter-stage coupling circuit comprising:

at least one input coupling structure mounted in the at least one cavity; and

at least one output coupling structure mounted in the at least one cavity and coupled to the at least one input coupling structure.

15. The filter assembly of claim 14, wherein the inter-stage coupling circuit further comprises a signal trace formed on the circuit board.

16. The filter assembly of claim 15, wherein the signal trace is formed in one of an internal circuit layer of the circuit board and a surface circuit layer of the circuit board.

17. A filter assembly, comprising:

an enclosure having a cavity;

at least one wall of the enclosure comprised of a circuit board; and

at least one diagnostic circuit formed on the circuit board.

18. The filter assembly of claim 17, further comprising:

a trace formed on the circuit board; and

at least one circuit element, coupled to the trace.

19. The filter assembly of claim 17, wherein the diagnostic circuit formed on the circuit board further comprises a signal tap.

20. The filter assembly of claim 17, wherein the diagnostic circuit formed on the circuit board further comprises a directional coupler, comprising:

a signal line with an RF signal; and

a sampling line, wherein the sampling line is run in parallel to the signal line and is physically proximate.

21. The filter assembly of claim 20, wherein the directional coupler further comprises a terminating resistance.

22. The filter assembly of claim 20, wherein the directional coupler further comprises a stub terminator.

23. The filter assembly of claim 20, wherein the sampling line is implemented on a surface of the circuit board.

24. The filter assembly of claim 20, wherein the sampling line is implemented on an internal layer of the circuit board.

25. The filter assembly of claim 20, wherein the sampling line is implemented on a same circuit layer as the signal line.

26. The filter assembly of claim 20, wherein the sampling line is implemented on a first circuit layer and the signal line is implemented on a second circuit layer.

27. A filter assembly, comprising:

an enclosure having at least one cavity;

at least one wall of the enclosure comprised of a circuit board; and

at least one tuning element, wherein the at least one tuning element extends into the at least one cavity of the enclosure.

28. The filter assembly of claim 27, further comprising:
a trace formed on the circuit board; and
at least one circuit element, coupled to the trace.

29. The filter assembly of claim 27, wherein the at least one tuning element is formed on the circuit board.

30. The filter assembly of claim 27, wherein the at least one tuning element is formed in the enclosure.

31. The filter assembly of claim 27, wherein the at least one tuning element is formed in a wall of the enclosure.

32. A method of tuning a filter assembly, comprising:
forming a cavity body with at least one chamber with at least one opening in the cavity body;
covering the openings in the cavity body with structural elements to enclose the at least one chamber, wherein at least one structural element is a circuit board; and
tuning the electrical characteristics of the cavity body by selectively adjusting an element on the circuit board.

33. The method of claim 32, further comprising:
forming a trace on the at least one circuit board; and
coupling at least one circuit element to the trace.

34. The method of claim 32, wherein the element on the circuit board comprises a capacitor.

35. The method of claim 32, wherein the element on the circuit board comprises an inductor.

36. The method of claim 32, wherein the element on the circuit board comprises a mechanically adjustable tuning element, where the mechanically adjustable tuning element extends into the at least one chamber of the cavity body.

37. A method of making a filter assembly, comprising:

forming a cavity body with at least one cavity and with at least one opening in the cavity body;

forming a trace on a printed circuit board;

coupling an electronic component to the trace; and

covering the at least one opening in the cavity body with the printed circuit board.

38. The method of claim 37, wherein coupling the electronic component to the trace comprises coupling a low pass filter to the trace.

39. The method of claim 38, wherein the low pass filter further comprises one of a circuit trace filter element and a mechanical structure filter element.

40. The method of claim 37, wherein coupling the electronic component to the trace comprises coupling an amplifier circuit to the trace.

41. The method of claim 40, wherein coupling the amplifier circuit comprises coupling at least one of a low noise amplifier and a power amplifier to the trace.

42. The method of claim 37, wherein forming the circuit board further comprises forming a ground plane on a surface of the circuit board that forms a portion of the inner surface of the cavity body.

43. The method of claim 37, wherein forming the circuit board further comprises forming multiple circuit trace layers.

44. The method of claim 37, wherein forming the circuit board further comprises:

forming an input connector attached to the cavity body and coupled to the at least one cavity; and

forming an output connector attached to the cavity body and coupled to the at least one cavity.

45. The method of claim 37, wherein forming the circuit board further comprises:

forming an input connector attached to the circuit board and coupled to the at least one cavity; and

forming an output connector attached to the circuit board and coupled to the at least one cavity.

46. The method of claim 37, wherein forming the circuit board further comprises:

forming a first and a second low noise amplifier;

forming an input connector attached to the circuit board and coupled to an input of the first low noise amplifier;

forming an input coupling pad mounted in the at least one cavity and coupled to an output of the first low noise amplifier;

forming an output connector attached to the circuit board coupled to an output of the second low noise amplifier; and

forming an output coupling pad mounted in the at least one cavity and coupled to an input of the second low noise amplifier.

47. The method of claim 37, wherein forming the circuit board further comprises:

forming a first filter stage and a second filter stage formed in the enclosure, wherein the first and second filter stage each have at least one cavity;

forming an input connector attached to the circuit board and coupled to the first filter stage;

forming an output coupling structure mounted in the at least one cavity of the first filter stage and coupled to an input of a low noise amplifier;

forming an input coupling structure mounted in the at least one cavity of the second filter stage and coupled to an output of the low noise amplifier; and

forming an output connector attached to the circuit board coupled to the at least one cavity of the second filter stage.

48. The method of claim 37, wherein forming the circuit board further comprises forming an inter-stage coupling circuit, the inter-stage coupling circuit comprising:
at least one input coupling structure mounted in the at least one cavity; and
at least one output coupling structure mounted in the at least one cavity and coupled to the at least one input coupling structure.

49. The method of claim 48, wherein forming the inter-stage coupling circuit further comprises forming a signal trace on the circuit board.

50. The method of claim 49, wherein forming the signal trace further comprises one of forming the signal trace in an internal circuit layer of the circuit board and forming the signal trace in a surface circuit layer of the circuit board.

51. A method of making a filter assembly, comprising:
forming a cavity body with at least one chamber with at least one opening in the cavity body;
covering the openings in the cavity body with structural elements to enclose the at least one chamber, wherein at least one structural element is a circuit board; and
forming at least one test circuit on the at least one circuit board.

52. The method of claim 51, further comprising:
forming a trace on the at least one circuit board; and
coupling at least one circuit element to the trace.

53. The method of claim 51, further comprising forming the test circuit with a connector.

54. The method of claim 51, wherein forming the test circuit on the circuit board further comprises forming a signal tap.

55. The method of claim 51, wherein forming the test circuit formed on the circuit board further comprises a forming a directional coupler, comprising:

forming a signal line; and

forming a sampling line, wherein the sampling line is run in parallel to the signal line and is physically proximate.

56. The method of claim 55, further comprising forming the directional coupler with a terminating resistance.

57. The method of claim 55, further comprising forming the directional coupler with a stub terminator.

58. The method of claim 55, further comprising forming the sampling line on a same circuit layer as the signal line.

59. The method of claim 55, further comprising forming the sampling line on a first circuit layer and forming the signal line on a second circuit layer.

60. A microwave system, comprising:

an antenna;

a RF system; and

a filter assembly coupled to the antenna and to the RF system, wherein the filter assembly comprises:

an enclosure having at least one cavity;

at least one circuit board comprising a wall of the enclosure;

a trace formed on the at least one circuit board; and

at least one circuit element coupled to the trace.

61. The microwave system of claim 60, wherein the circuit board further comprises a ground plane on a surface of the circuit board that forms a portion of the inner surface of the enclosure.

62. The microwave system of claim 60, wherein the at least one circuit board further comprises multiple circuit trace layers.

63. The microwave system of claim 60, wherein the at least one circuit element further comprises a low pass filter.

64. The microwave system of claim 63, wherein the low pass filter further comprises one of a circuit trace filter element and a mechanical structure filter element.

65. The microwave system of claim 60, wherein the at least one circuit element further comprises an amplifier.

66. The microwave system of claim 65, wherein the amplifier is one of a low noise amplifier and a power amplifier.

67. The microwave system of claim 60, wherein the filter assembly further comprises:
an input connector attached to the enclosure and coupled to the at least one cavity; and
an output connector attached to the enclosure and coupled to the at least one cavity.

68. The microwave system of claim 60, wherein the filter assembly further comprises:
an input connector attached to the circuit board and coupled to the at least one cavity; and
an output connector attached to the circuit board and coupled to the at least one cavity.

69. The microwave system of claim 65, wherein the filter assembly further comprises:
an input connector attached to the circuit board and coupled to the at least one cavity;
an output connector attached to the circuit board coupled to an output of the amplifier; and

an output coupling pad mounted in the at least one cavity and coupled to an input of the amplifier.

70. The microwave system of claim 65, wherein the filter assembly further comprises:
an input connector attached to the circuit board and coupled to an input of the amplifier;
an input coupling pad mounted in the at least one cavity and coupled to an output of the amplifier; and
an output connector attached to the circuit board coupled to the at least one cavity.

71. The microwave system of claim 60, wherein the filter assembly further comprises:
a first and a second low noise amplifier;
an input connector attached to the circuit board and coupled to an input of the first low noise amplifier;
an input coupling pad mounted in the at least one cavity and coupled to an output of the first low noise amplifier;
an output connector attached to the circuit board coupled to an output of the second low noise amplifier; and
an output coupling pad mounted in the at least one cavity and coupled to an input of the second low noise amplifier.

72. The microwave system of claim 60, wherein the filter assembly further comprises:
a first filter stage and a second filter stage formed in the enclosure, wherein the first and second filter stage each have at least one cavity;
an input connector attached to the circuit board and coupled to the first filter stage;
an output coupling structure mounted in the at least one cavity of the first filter stage and coupled to an input of a low noise amplifier;
an input coupling structure mounted in the at least one cavity of the second filter stage and coupled to an output of the low noise amplifier; and
an output connector attached to the circuit board coupled to the at least one cavity of the second filter stage.

73. The microwave system of claim 60, wherein the at least one circuit formed in the at least one circuit board comprises an inter-stage coupling circuit, the inter-stage coupling circuit comprising:

at least one input coupling structure mounted in the at least one cavity; and

at least one output coupling structure mounted in the at least one cavity and coupled to the at least one input coupling structure.